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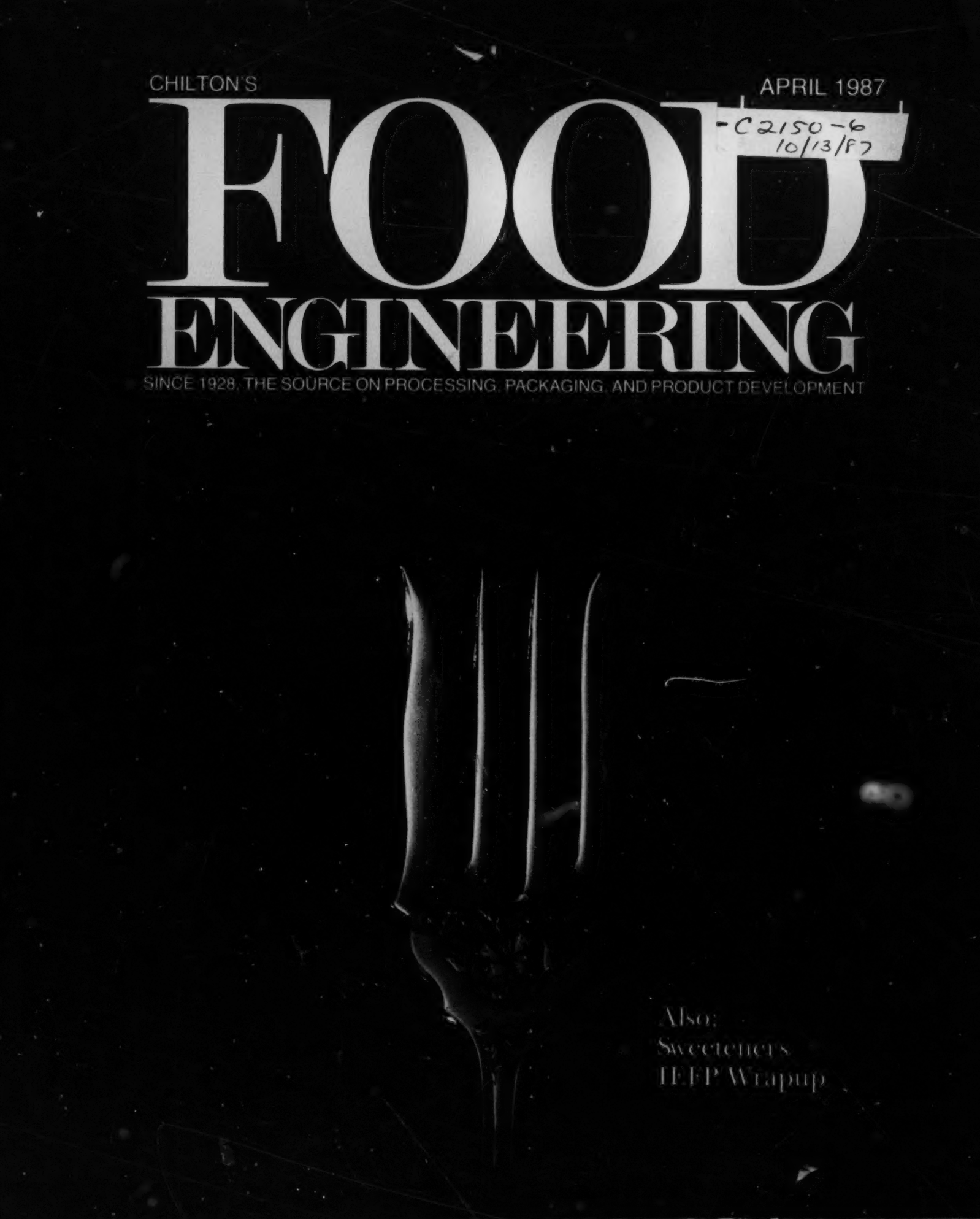

Also:
Sweeteners
IFP Wrapup

FOOD ENGINEERING

COVER STORY
Food Engineering's annual new products analysis found that the driving forces behind the 1986 introductions were freshness, healthfulness, convenience and excitement.

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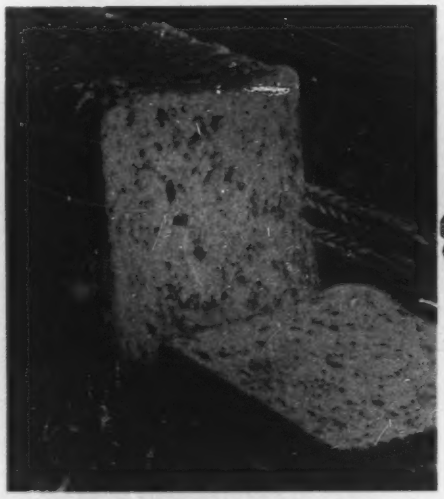

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SWEETENERS: SUGAR UNDER FIRE

New developments in corn sweeteners and aspartame are attacking sugar on two fronts: cost and diet. And a host of new sweeteners are waiting in the wings for FDA approval.

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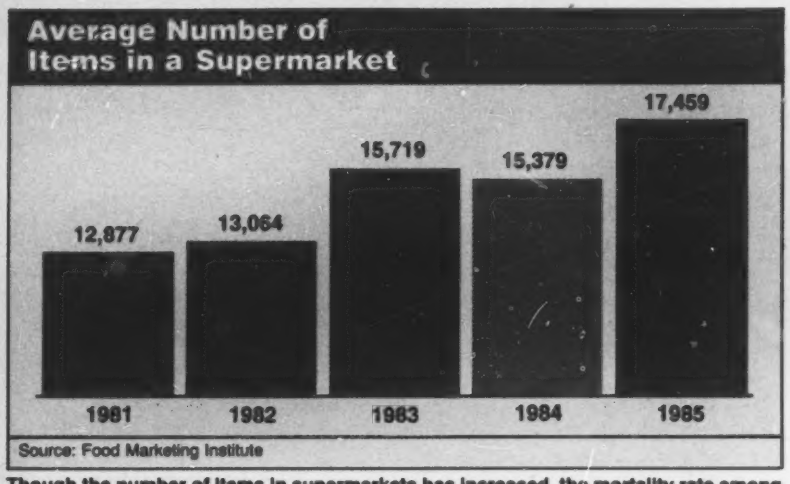
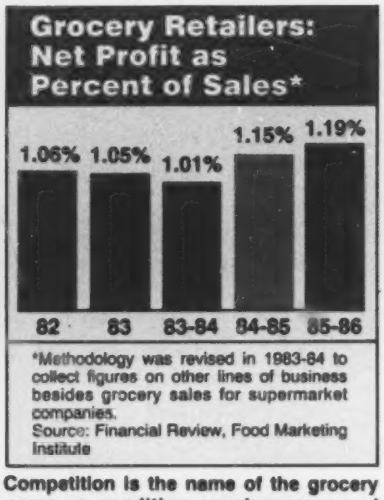
Improving your odds in the fight for shelf space



Though the number of items in supermarkets has increased, the mortality rate among products fighting for shelf space hasn't. On the average, over 55% of all new food items presented to grocery retailers never even make it onto the shelf.



Competition is the name of the grocery game—a condition causing more and more products to be pushed off the shelf.

Marketing a new product to today's fickle consumer is difficult. But marketing products to grocery retailers is just as hard. Understanding the supermarket business, and what retailers want, are key to making the most of your new product.

Supermarkets are becoming more competitive and more sophisticated—a trend that is causing a higher product turnaround than ever before.

Supermarkets, which average profits only slightly higher than one cent on each consumer's dollar, have lately adopted measures which have changed how they evaluate incoming new products:

• Direct Product Profitability—a system that measures each item's actual profit contribution to the retailer—is becoming more popular as a management tool. Though recognized for over twenty years, computerization has made this formula for determining profitability more efficient and more accurate.

"It begins with a product's adjusted gross margin to reflect such factors as deals and allowances, and it identifies and measures costs that are directly attributable to the product: labor, space, inventory and transportation," explains the Food Marketing Institute. "It helps determine the most profitable product mix and effects of promotions and advertising."

• Grocery retailers, have also instituted more efficient market research systems, allowing them to respond to consumer desires—and withdraw products once they're on the shelves—faster than ever before. Over 12,861 supermarkets nationally are using UPC scanning devices—a no-mistake system of measuring what sells, and what doesn't. "Supermarkets can now respond fast to changing consumer tastes," says the Food Marketing Institute, "and UPC and scanning devices help them track performance of each individual food product."

With more sophistication in the marketplace, the success rate for new products entering the marketplace should be good. Ironically, though, the majority of new food products never even make it to the grocery shelf. The major grocery retailers agree that, on the average, over 55 percent of all products presented to their buyers are turned down before even reaching the shelf.

In the twelve months of 1985, Stop & Shop's Grocery Buying Staff evaluated 2,429 grocery products, frozen foods and dairy items—of which 1,385, or 57 percent, were turned down because they did not meet this retailer's "criteria for authorization"—and 1,044, or 43 percent, were purchased. One year later, the firm reports, 40 percent of the accepted items were discontinued due to lack of movement, and a further analysis showed that of the 2,429 items presented in 1985, only 632 or 26 percent are still on the shelves today.

Getting in the door

And though retailers' criteria for accepting new products varies from product to product, the three national grocery retailers interviewed by *FE* said they look for the following characteristics:

• *Promotional Support.* "We want national advertising exposure, couponing, and the security of a national brand name," says a Publix representative. "This is how we are relatively assured of having good sale potential with a new item." The representative says that placing a nationally-backed, branded item on the shelf is much "more realistic" than placing on the shelf an "item no one has ever heard of."

At a recent National Food Processors Association conference, Stop & Shop's Vice President of Grocery and General Merchandise Sales and Procurement Richard Ponte suggested that more processors and retailers work together to both develop and

(Continued on next page)

(Continued from previous page)

market products. "At Stop & Shop," he said, "we distribute 3.5-million circulars per week with a vast array of weekly specials. Our TV advertising offers an opportunity to place new products prominently in our commercials, and in-store sampling provides an opportunity to expose customers to these products at point of sale."

• *Quality, Convenience, Value!*

"While this may sound simplistic, new products which truly have all of these attributes are not as common as you may think," said Stop & Shop's Ponte. Ponte used Stouffer's Lean Cuisine as an example of what this retailer looks for in a new product. The frozen entree took ten years to develop because, according to Stouffer President David Jennings, the numbers took a back seat to the "real issue:" taste.

The successful introduction of Lean Cuisine, said Ponte, not only created a category of low-calorie, high-quality meals with broad-based appeal, but, for the first time, offered frozen food as a positive, convenient alternative. And though the dinners are not inexpensive, says Ponte, the items offer value to the consumer because they save preparation time.

• *Expandable categories.* The most difficult areas in which to find shelf space, says a Safeway spokesman, are those "non-expandable" places in the supermarket, such as frozen food and dairy cases. "Our frozen food area has increased in item count from 500 to 1,000 in the last five years," he says, "and it's a real tough area to squeeze new items into."

• *Market Conditions.* One other major retailer stresses the importance of timing: "The competitive situation, existing market shares and number of items in that market, as well as future projections based on our own marketing research, determine which products we will accept and which products we won't."

Retailers differ in their methods of measuring market potential, and all declined to be specific about how they authorize food products. But all suggest that food firms contact retailers individually, in the early stages of new product development. When processors familiarize themselves with retailers' specific "product-approval criteria" for their market, says Ponte, that processor improves his chances for product success. Working together from the start, they agree, can help insure shelf space for tomorrow.

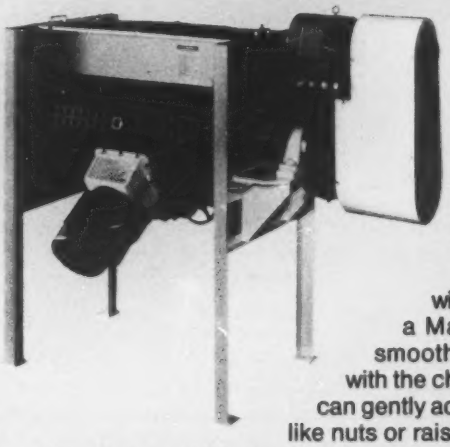
Store Formats Type and Number in U.S.

Conventional	21,890
Combination	850
Convenience	45,400
Super Store	4,400
Economy*	3,365

*includes limited assortment, warehouse & super warehouse & hypermarket
Source: Progressive Grocer, Annual Report, 1985

The number of convenience stores is rising—dictating a more convenience-oriented product mix on store shelves.

GET AGGRESSIVE AND GENTLE MIXING WITH ONE MARION MIXER



Marion paddle mixers can quickly produce blends of uniform color and texture, or gently mix fragile products like coffee beans, leafy herbs or fruited yogurt. In fact, you can do both with the same machine.

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Marion Mixers

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A new type of barrier is forming for

Plastic Packaging

Environmental concerns over the disposal of plastic wastes could deal the progress of plastic packaging a harsh blow.

Plastics are projected to be the packaging material of the future. However, there is growing concern over the disposal of plastic waste. According to the NFPA, four bills have already been introduced in the new Congress dealing with the disposal of plastic wastes on land and into the marine environment. This federal attention reflects a growing interest at the state level about minimizing the environmental impact of plastics.

At the DuPont Packaging Forum recently held in New York, four speakers addressed the issue of plastic waste disposal.

Assemblyman Arthur R. Albohn, of the New Jersey State Legislature stated that New Jersey is about to put the nation's first mandatory source separation and recycling legislation into effect. Municipalities of the state will be required to choose three materials from a broad list for recycling.

The law contains a provision requiring plastic beverage containers to be removed from the waste stream for recycling at the same rate as the lesser rate of either glass or aluminum beverage containers.

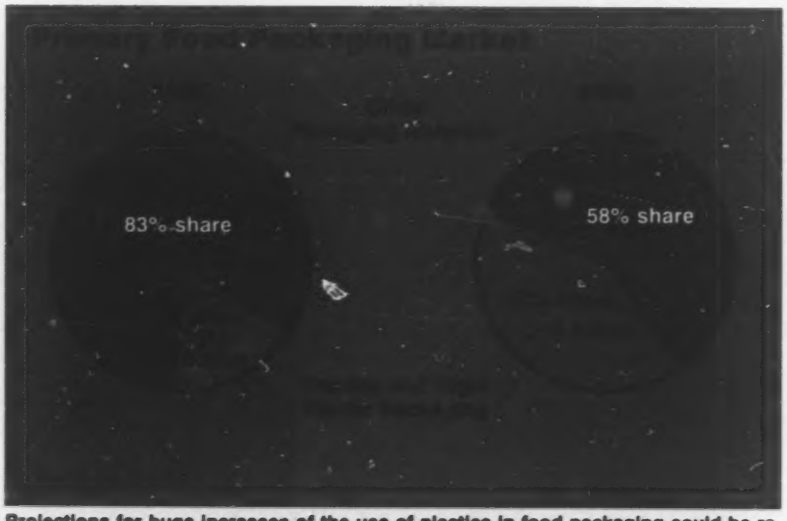
Dr. Melvin Druin, vice president of packaging for Campbell Container Co., a subsidiary of Campbell Soup, said that the consumer demand for convenience has resulted in the development of new microwaveable food products and has created a demand for new plastic packaging. Druin states that Campbell sees plastic packaging, "not as a replacement to existing materials, but as a means to providing broader packaging options and choices beyond metal, glass and paper to meet our consumer needs."

Druin said that a combination of recycling, resource recovery and land filling is necessary to create an environmentally sound approach to the solid waste problem.

Charles O'Connell, president of the Society of the Plastics Industry (SPI), said that the plastics industry is trying to educate legislators, regulators and environmentalists that ad hoc attempts to deal with a complex societal problem by banning certain plastics is only a Band-Aid approach to the solid waste question. The SPI is trying to help answer questions about using incineration and recycling as primary disposal methods. O'Connell says that through the SPI, the industry is participating in a series of full-scale incinerator tests to address emissions concerns. O'Connell stated that the plastics industry was the impetus for the Plastics Recycling Foundation.

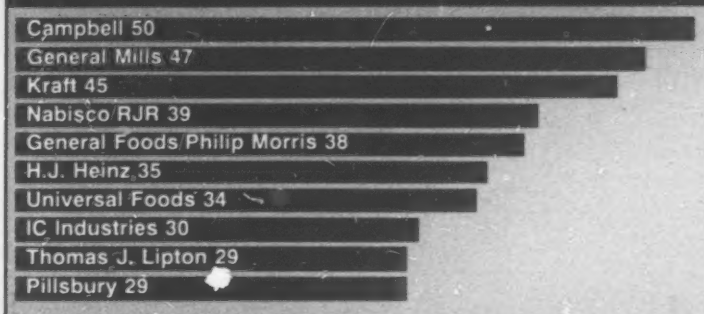
Joe Bowers, Jr., manager, packaging products for Coca-Cola USA, limited his comments to PET soft drink containers. According to Bowers, the soft drink industry supports voluntary PET recycling as an answer to the disposal problem.

From the concern of the participants in the forum, one thing is clear. If long term waste disposal answers are not found, there is a chance that plastics, as a form of packaging could be legislated out of existence.



Projections for huge increases of the use of plastics in food packaging could be reversed, unless the concerns for the disposal of plastic wastes are answered.

Top Ten Manufacturers for 1986*



*All totals include divisions/subsidiaries

Source: Marketing Intelligence Services

Food Companies with 5 or More Introductions in 1986

41	Kraft	7	Entenmann's
41	General Mills	7	Carnation
32	Campbell Soup	7	Arnold Foods
31	Liberty/Ramsey Imports	6	Sunshine Biscuits
30	Nabisco Brands	6	Southern Traditions
28	Pet	6	Sable and Rosenfeld Foods
25	General Foods	6	Mother's Food Products
24	Pillsbury	6	Michigan Fruit Canners
21	Thomas J. Lipton	6	M&M Mars
18	Frito-Lay	6	Kenston Kitchens
17	R.T. French	6	Hershey Foods
16	Borden	6	Gourmands
13	Weight Watchers International	6	Doxsee Food
13	Reese Finer Foods	6	Bahlsen of America
13	Beatrice	5	Topps Chewing Gum
12	Quaker Oats	5	Sunfresh
12	Procter & Gamble	5	Snacktime
11	Ralston Purina	5	Schwartauer Werke
10	Pepperidge Farm	5	Progresso Quality Foods
10	Kellogg	5	Popsicle Industries
10	Health Valley Foods	5	Original Trenton Cracker, The
10	H.J. Heinz	5	Nalaley's Fine Foods
10	Geo. A. Hormel	5	Mrs. Paul's Kitchens
9	Hain Pure Food	5	Little Bear Organic Foods
9	Continental Mills	5	Legume
8	Specialty Grain	5	Lawry's Foods
8	McKee Baking	5	Interbake Foods
8	General Biscuits of America	5	Hershey Chocolate
8	Durkee Famous Foods	5	Goya Foods
7	Warner-Lambert	5	Gourmet Foods
7	Stouffer Foods	5	Gourmet Confections
7	Ore-Ida Foods	5	French Cuisine
7	National Sea Products	5	Ferrara Foods & Confections
7	McCormick	5	Del Monte
7	Keebler	5	Celestial Farms
7	H.P. Hood	5	Best Foods

Source: Marketing Intelligence Services

Explains Ernest Townsend of General Host, "Most frozen food manufacturers have forgotten that every product has a value relationship—consumers are willing to pay for quality, but they're not willing to overpay for it."

Despite the astounding number of new foods introduced in 1986 and the seemingly conflicting trends, the driving forces behind many of them can be summerized in four words—fresh, healthy, convenient, and exciting. Americans are more health conscious than a decade ago, but they won't give up quality and they do believe in rewarding themselves.

Food Engineering has identified eight areas of new product introductions. Each of these areas is a result of meeting consumers' needs and is fueled by one or more or the driving forces mentioned above. The categories are: "Lite" or "Less of"; Gourmet; Fresh; Breakfast Foods; Foods with Tofu; Convenient Foods; Ethnic; and Fruit Enhanced Foods. These categories are obviously interconnected. For example, health concerns are responsible for more people turning to fruit-enhanced products, but a desire for more exciting foods is leading to the introduction of foods containing more exotic fruits such as kiwi and passion fruit.

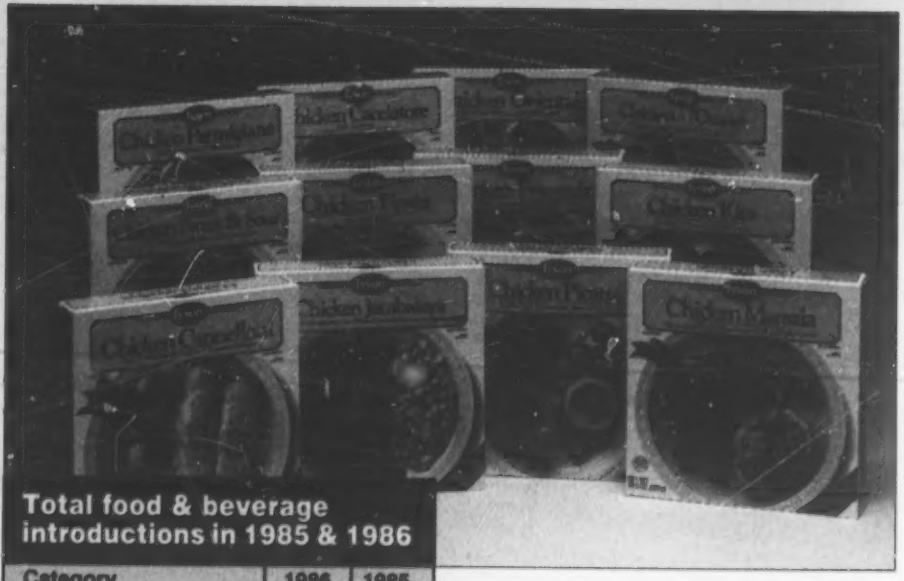
Some new food products can fall in several of these categories. One example is Tyson's new line of International frozen entrees. They offer the convenience of microwave oven preparation; they all contain chicken, and chicken is perceived as a "healthy" source of protein; and the international cuisine theme offers excitement. Filling so many consumer desires, it's not surprising that this line is doing extremely well.

The future

The major reason for food processors to examine new product introductions from a previous year is to identify hot areas for future new product introductions. General Foods' President and CEO, Philip Smith, told *Advertising Age* that he believes health-oriented products will remain on the rise and that low-cholesterol and low-fat products will be the fastest-growing areas. He added that fiber will continue to be important, but things like calcium will come and go.

Other areas where new products activity is likely to be active are:

- Carbonated dairy beverages.
- New ethnic foods—such as American Indian or Vietnamese.
- Improved fresh foods.



The broad consumers appeal of Tyson's line of international Frozen Entrees made it one of the most successful new products introduced in 1986.

Total food & beverage introductions in 1985 & 1986

Category	1986	1985
Non-alcoholic beverages	408	343
Snacks	276	227
Confectionery	217	186
Alcoholic beverages	199	177
Sauces & gravies	183	128
Bread & bakery	181	121
Cookies & crackers	175	136
Dairy products	172	126
Ice cream & frozen conf.	121	102
Salad dressings & dips	121	85
Frozen meals	114	99
Staples & seasonings	108	91
Frozen meats, poultry & fish	93	65
Meat, fish, poultry	86	125
Fruits & vegetables	79	92
Pasta & rice	79	66
Condiments	78	60
Meals & meal mixes	74	47
Cereals	71	60
Misc. foods	68	52
Pet foods	67	9
Soups	59	48
Jams, jellies, sweet spreads	58	28
Sweet toppings & syrups	54	33
Frozen other	43	77
Frozen fruits & vegetables	42	32
Frozen breads & bakery	37	30
Mixes & frostings	30	47
Savoury & nut spreads	28	12
Desserts	21	29
Alcoholic substitute bev.	15	17
Diet Foods	13	24
Frozen beverages	13	9
Baby foods	6	5
TOTAL	3,389	2,872

•Breakfast soups (a popular category in Europe).

•Foods with more low- or unsaturated oils – this will occur as more becomes known about how saturation levels of oil effect our health.

•Upscale condiments – especially other than mustards since this area is becoming saturated.

•And even more convenience-engineered foods.

Fruit-Enhanced

America's most popular dessert is fruit – including fruit salads. That is the finding of a report from Stamford, CT-based MRCA Informations Services which collects data from nearly 5,500 individuals in 2,000 nationally representative households.

Fruit and fruit salads are eaten as dessert with meals an average of 72 times per year per person, according to the report. This is more often than cakes and cookies combined – the second and third most popular desserts in this country.

To capitalize on fruit's growing popularity due to its health appeal, food processors are incorporating fruit into more new products. Strawberries, the most common fruit ingredient, were included in 219 new foods last year as compared to 118 for the previous year, according to Marketing Intelligence Services. Orange, apple, cherry, and raspberry (in that order) were the next most common fruits incorporated in new products last year.

Kiwi, which didn't find its way into any new products in 1985, was added to six new products in 1986. An example of a kiwi item introduced last year was Sliced Kiwi Fruit

(Continued on page 64)

Introductions of Foods Containing Fruit

Fruit	1986	1985
Apple	149	100
Apricot	39	23
Avocado	6	3
Banana	62	37
Blackberry	20	8
Blueberry	69	44
Cherry	141	86
Cranberry	23	9
Dates	17	20
Grape	64	26
Grapefruit	9	5
Guava	6	0
Kiwi	10	3
Lemon	96	54
Lime	35	13
Mandarin	17	6
Mango	1	1
Orange	168	105
Passion fruit	0	1
Peach	59	46
Pineapple	33	12
Plum	25	23
Raspberry	136	67
Strawberry	219	118
Watermelon	12	5

Source: Marketing Intelligence Services

in light syrup from Pacific Marketing, Westlake, CA.

The alcoholic beverage category that showed the greatest growth last year was one with added fruit juice—wine coolers. 1986 was the year that wine cooler sales topped $1 billion. But a shakeout of this category also began last year, with several brands being pulled off the market. This shakeout made it important for new wine coolers to really offer something new. One of these is Cod Cranberry Cooler—it is made from cranberry wine, not wine made from grapes or a malt base. While this product wasn't initially introduced last year, it was expanded into new markets during 1986.

Non-alcoholic beverages containing juice also saw growth last year. Consumption of fruit juice and noncarbonated drinks is slated to grow 9.8 percent per year to reach a manufacturers' sales level of $16.7 billion in 1994, according to Business Trend Analysts.

Dole Food Co., San Francisco, expanded its Pineapple Breakfast Juices into New England during 1986. Previously they were only available in the western United States where sales quickly surpassed projected volume.

Kashu Fruit Products, Inc., Corona, CA, introduced C-Burst All Natural Juice Drinks with whole juice cells last year. The orange or grapefruit varieties each contain 15 percent orange or grapefruit juice and 10 percent citrus cells.

While fruit juices and fruit drinks remain one of the smaller segments of the overall drink category, Marketing Intelligence Services forecasts that this segment will see major expansion during the remainder of the 1980s and 1990s. One area expected to grow is fruit teas. Boulder, CO-based Celestial Seasonings, Inc., a division of Kraft, introduced its Fruit & Tea—a blend of black tea with 50 percent real fruit, herbs, and spices—towards the end of last year. Varieties offered are: Oranges & tea, lemons & tea, raspberries & tea, apple spice & tea, and citrus & tea.

It is common knowledge that fruit juice is also being added to a number of carbonated beverages—many at the 10 percent level. But a host of new products are being introduced with higher levels of fruit juice. Fruitzer, from Fruitzer Company, New York, is 100 percent sparkling fruit juice. It is offered in apple, grape, cherry, and cranberry varieties.

Snack foods is another category where food processors are capitalizing on consumers' heightened interest in fruit. Dallas-based Frito-Lay—in a departure from salty snacks—introduced McCracken's Apple Chips into test market. And T.J. Lipton added two new varieties to its successful Fun Fruit line. Tropical fruit, berry bunch, and fantastic fruit punch varieties were added to existing cherry, grape, orange, and strawberry varieties. Described as bite-size, chewy, real fruit snacks, Fun Fruit were originally introduced in July of 1985.

The $256 million frozen fruit/juice category also saw a lot of new product action last year. Quaker Oats began testing a line of frozen fruit ices under the Great Arctic Fruit Co. brand. Other 1986 introductions in this category included: United Brand's Chiquita Fruit & Juice Pops and Fruit & Cream Bars, Sara Lee's Popsicle Industries' Fruitsicles, General Foods' Jell-O Fruit & Juice Bars, and Coca-Cola Foods' Minute Maid Fruit Juices.

Food manufacturers have capitalized on consumers' heightened interest in fruit with products such as T.J. Lipton's Fun Fruit line which was expanded in 1986.

"Lite" or "Less of"

Americans' preoccupation with health and fitness is definitely impacting their eating habits. During 1986, sales of diet foods grew at a much faster rate than sales for comparable food products—a trend that will continue, according to the Stamford, CT-based market research company, Business Communications Co., Inc. (BCC). BCC points out in its report *Diet Foods: Markets, Developments, Players* that sales of all types

(Continued on page 69)

Insert 44 or see FEM, p. 31→

of diet foods and beverages will grow at an average annual rate of 7.3 percent over the next five years. And it will reach at least $28.8 billion by 1990. Much of this growth will come from new products, the report points out.

Of the foods introduced in 1986, 207 were listed specifically as diet products, 38 as light foods, and 34 as lite foods, reports Marketing Intelligence Services. In 1985, these figures were 101, 20, and 35, respectively. And several studies have shown that non-dieters often consume more light/low-calorie foods traditionally believed to be targeted for dieters.

Frozen entrees with reduced calories continue to be popular. Le Menu Light Style Dinners from Campbell Soup, Gorton's Light from General Mills, Mrs. Paul's Light Seafood Entrees, Classic Lite Meals from Armour Frozen Food, and On-Cor Lite Frozen Entrees were all 1986 introductions.

Salt-free and sugar-free foods are growing at an even faster rate than "diet foods." According to Business Trend Analysts (BTA), Inc.'s report, *The Markets for Salt-Free and Sugar-Free Foods*, growth of salt-free and sugar-free foods has averaged 18 percent over the past several years, compared to an average annual growth rate of just over three percent in the overall food industry. The report continues to point out that "the big winners in the market for sugar-free foods have been hot cocoa mixes, beverages, sugar substitutes, candy and gum, and canned fruit, while low-sodium canned vegetables, and meats and seafoods have flourished in the market for salt-free foods."

Manufacturers' sales of selected reduced sodium & sugar foods

	1982	1986E	1995P
Soft drinks	$1,871	$3,486	$11,378
Cereal	535	898	2,426
Candy & gum	278	625	1,638
Sugar substitutes	101	307	683
Canned fruit	124	251	610
Canned vegetables	56	151	478
Hot cocoa mixes	12	93	193
Sauces & dressings	42	83	232
Spreads & syrups	59	80	108
Meats & seafoods	27	58	265
Salt substitutes	36	30	50

E - Estimate P - Projection Source: Business Trend Analysts

As more and more consumers become concerned with health, and hence, the amount of calories consumed, more products such as Classic Lite Meal from Armour Frozen Food are appearing on the market.

Reduced sugar

The approval of aspartame in 1981 began a revolution in the sugar-free food category. The soft drink industry was perhaps the greatest beneficiary of aspartame's approval—aspartame was first allowed in soft drinks in the U.S. in 1983. BTA predicts that the 1995 sugar-free segment will claim greater than 40 percent of the projected $27 billion in soft drink sales.

In the dry mix beverage category, General Foods introduced two aspartame-sweetened varieties of Kool-Aid in 1986—Strawberry Falls Punch and Raspberry.

The reduced sugar category will continue to expand—especially with the U.S. Food and Drug Administration's November 1986 ruling which approved the use of aspartame in several new categories of foods. This decision opened the way for the introduction of TreeSweet Lite juices with one-third less calories than regular juice. Available in frozen concentrate and chilled forms, the new line from Houston-based TreeSweet Companies is sweetened with aspartame.

The market for sugar-free and low-sugar foods will continue to post gains of roughly 13 percent per year over the course of the next decade, predicts BTA.

Reduced sodium

While sodium's exact role in high blood pressure continues to be debated, it is accepted that excess sodium consumption is one factor contributing to this condition (stress and obesity are some others).

Americans have been reducing sodium intake—usually by reducing salt intake. This has provided opportunities for marketers of low-sodium foods. Sales of low-sodium canned vegetables, for example, have grown at a rate of 28 percent per year, help-

(Continued on page 70)

← Insert 46 or see FEM, p. 31

ing to revive an otherwise stagnant category, according to BTA's report on salt- and sugar-free foods.

It was during 1986 (July) that FDA published its long-awaited sodium labeling regulations. Several products introduced in 1986 in this category were: Salt Sense—a table salt with 33 percent less sodium by volume than regular salt from Diamond Crystal Salt Co., St. Clair, MN and a salt-free version of General Mills' Pop-Secret microwave popcorn.

Reduced fat and/or cholesterol

New product introductions with reduced fat and/or cholesterol ranged from Ore-Ida Lites—frozen french fries with one-third less oil than regular fries—to Kaukauna Lite cold pack cheese food spread with 50 percent less fat and 34 percent less cholesterol to leaner meats.

Test marketing of UltraBeef Natural/Lite began in 1986. Ninety to 95 percent fat-free, or 46 percent lower in fat than corresponding cuts of regular beef, UltraBeef is produced by controlled or planned breeding and selection. UltraBeef is distributed and marketed by Baltimore-based Mash's Meats. Its test market success led to expanded distribution in early 1987.

Breakfast Foods

Americans' increased concern about their health has resulted in an increased awareness of the importance of breakfast. At least this is a logical conclusion to draw if one looks at the rising sales of breakfast foods. Not only are more prepared breakfast items being sold, consumers are being offered a greater variety of convenient breakfast foods.

In a study, *The Market for Breakfast Foods*, Business Trend Analysts broke down breakfast foods into three product areas:

1) Frozen Breakfasts and Pancake/Waffle Preparations—encompassing frozen waffles, French toast, pancakes, and breakfast entrees; and pancake and waffle mixes and batters.

2) Cereals—including both hot and cold cereals—as well as baby cereals.

3) Baked Breakfast Foods—covering a wide variety of items which are commonly associated with breakfast such as bagels, toaster pastries, muffins, English muffins, croissants, sweet rolls, coffee cake, donuts, and pastry.

Together, these products comprised an $8.7 billion market in 1985, and were estimated by BTA to reach $9.4 billion in 1986.

Bagels is the fastest growing category of baked breakfast foods, with the possible exception of toaster pastries, according to BTA. Yet a tremendous potential for expansion of the bagel market exists since four out of five American have never eaten a bagel, BTA continues.

The smallest category of breakfast foods is the frozen breakfast and frozen pancake and waffle group, although it is slated by BTA for the most optimistic future. Presently the field is dominated by Campbell Soup Co., ConAgra, IC Industries' Pet division, and The Quaker Oats Co. They're going after the consumer who eats breakfast

Aunt Jemima Pancakes from The Quaker Oats Co. are among the host of new breakfast foods available.

at fast food outlets.

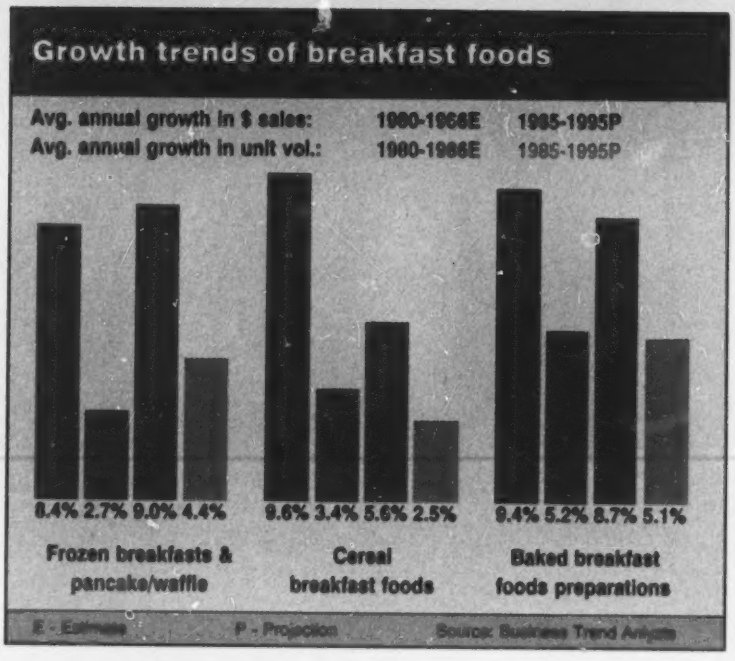
In May of 1986, for example, Campbell Soup announced the national rollout of Great Starts Breakfast Sandwiches – a four-variety line of breakfasts on muffins or biscuits which can be heated in microwave or conventional ovens. In making the introduction, Archie van Beuren, product marketing manager for Campbell Soup Frozen Foods, said, "With Great Starts Breakfast Sandwiches, consumers now can enjoy in their homes the same kinds of breakfast sandwiches that have become so popular in fast food restaurants."

"There is tremendous interest in frozen breakfasts," van Beuren continued. "From 1980 to 1984, frozen breakfasts grew in dollar sales by 61 percent. Also of relevance is the fact that between 1977 and 1984, breakfast sales at restaurants jumped 56 percent. Breakfast sandwiches represent 18 percent of all breakfasts served in restaurants."

The Quaker Oats Company expanded its offerings of frozen breakfast items in 1986 with the introduction of a three-item line of Aunt Jemima Homestyle Breakfast entrees and three hash-brown potato patty products under the Aunt Jemima Toaster Browns name. The entree items are: Pancakes with sausages, French toast wedges with sausages, and Pancakes with bacon slices. Available in Ohio, Indiana, Michigan, Kentucky, Virginia, West Virginia, and Wisconsin, they feature Swift Premium Brown 'N Serve Sausage and Swift Premium Bacon. Toaster Brown comes in original, onion, and western style varieties.

Sales of breakfast cereals grew at a 9.6 percent annual rate throughout the first half of the 1980s, reports BTA. The marketing research firm cites burgeoning demand for high-fiber bran cereals as a partial reason for this growth. Raisin Nut Bran Cereal from General Mills, Inc. and Golden Temple Natural Blueberry Whole Grain Cereal from Golden Temple, Eugene, OR, were among the new cereals in 1986 aimed at the health conscious.

On the other end of the scale, a number of new children's cereals were also introduced in 1986. Included in this group are Rocky Road Cereal from General Mills, Inc. and Ghostbusters from Ralston Purina.

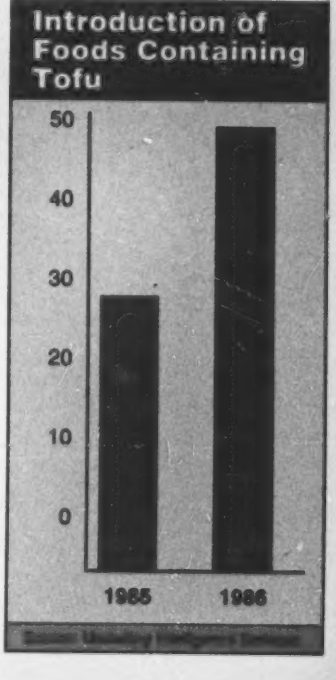

Growth trends of breakfast foods
Avg. annual growth in $ sales: 1980-1986E 1985-1995P
Avg. annual growth in unit vol.: 1980-1986E 1985-1995P
8.4% 2.7% 9.0% 4.4%
9.6% 3.4% 5.6% 2.5%
9.4% 5.2% 8.7% 5.1%
Frozen breakfasts & pancake/waffle
Cereal breakfast foods
Baked breakfast foods preparations
E - Estimate
P - Projection
Source: Business Trend Analysts

Foods with Tofu

While much of Tofu's increased popularity is due to its health-related advantages, a separate category is being devoted to it because of its rising popularity and versatility as an ingredient. Touted as having no cholesterol, tofu is often used as a replacement for dairy products. Currently the tofu industry in the U.S. is a $60 million business with projected sales topping $500 million by the end of the decade.

Tofu is produced by soaking soy beans in water. The wet beans are then ground and the fibrous material is filtered out. The remaining mixture is heated and a coagulant added so that a soy curd forms. The soy curd is then pressed to separate it from the whey and the resultant product is tofu.

Brightsong Foods introduced Le Tofu last June as a non-dairy product with premium ice cream taste.



New products introduced last year containing tofu included wafers, puddings, cookies, frozen desserts, salad dressings, entrees, cheeses, and soup. Le Tofu was introduced last June as "a non-dairy product that achieves a premium ice cream taste." It is manufactured by Brightsong Foods, Petaluma, CA, which has been developing and distributing tofu products since 1978.

Brightsong also introduced vacuum-packed tofu last year. The company hoped that its introduction would help bring tofu

(Continued on page 74)

into the mainstream of consumer products—a direction it is definitely heading.

Another new tofu-based product, Jofu is marketed as the first chilled, spoonable blend of tofu and fruit. Originally introduced in 1985, its distribution was expanded in 1986 to include all of New England. Produced by Greenfield, MA-based Tomsun Foods, Jofu is a spoonable blend of Silken tofu and fruit. In addition to having no cholesterol, Jofu has no lactose; low levels of fat and sodium; and is high in protein, calcium, and iron.

A frozen entree made with tofu is Tofoods Brand Premium Tofu Entrees from Silver Springs, MD-based Tofoods Company. First introduced in 1985, these entrees saw expanded distribution in 1986. Bar-B-Q Tofu, Sweet and Sour Tofu, and Tofu Teriyaki varieties are offered.

Gourmet Foods

Not too many years ago, if one wanted to purchase a specialty food such as extra virgin olive oil, imported Icelandic lumpfish caviar, a wine vinegar made from Chardonnay wine, or even fresh pasta, only a few options were available. Certain supermarkets possibly carried it in their limited gourmet section or, more likely, one would have had to locate a specialty food store or place an order through a mail order house which handled gourmet foods.

Stores Selling Gourmet Foods

Type	1980	1986
Supermarkets	20,000	30,000
Specialty Food Stores	6,000	25,000
Department Stores	100	1,200
Catalog, Other (Cookware, Coffee, Candy, Cheese)	200	9,000

Source: Frost & Sullivan

Now, purchasing gourmet foods has become much easier due to their increased popularity with a consuming public more educated about food. The entrance of major manufacturers like McCormick, Kraft, and General Foods has also made these upscale foods more accessible.

Frost & Sullivan (F&S), a New York City-based marketing research firm, has been tracking gourmet food sales. F&S reports that the number of specialty food stores has risen from 6,000 in 1980 to 25,000 in 1986. And the number of supermarkets with some sort of gourmet section went from 20,000 to 30,000 during the same period.

Although almost half of the specialty retailers in a F&S survey felt that gourmet sales in supermarkets hurt their business, some felt the opposite is true. Since gourmet food sections in supermarkets help educate consumers, making them more familiar with specialty foods, this helps the sales of these foods. Either way, the supermarket is expected to have the best potential for increased sales of gourmet foods over the next ten years.

A precise definition of gourmet foods presents a challenge at best. Frost & Sullivan did come up with one based on discussions with distributors and retailers in the business, and from surveys of representative groups from both segments: "Gourmet foods are comprised of excellent ingredients, blended through a careful process of manufacture into the highest quality items possible."

Based on this definition, 1986 retail sales of gourmet food products was estimated to be $8.5 billion. F&S projects a growth rate averaging eleven percent through 1990.

Several subcategories within gourmet food saw an exceptional amount of activity last year. These were:

•Beverages. Nonalcoholic malt beverages,

Ice cream toppings from Godiva are one of the many gourmet foods introduced last year.

specialty sodas, specialty coffees and teas (including herbal teas), and sparkling mineral waters are usually marketed as gourmet beverages. 1986 was the year that Mrs. Fields announced the introduction of Diet Chocolate Soda and Macadamia Nut Soda. Produced through a joint venture with AGS Brands of Burlingame, CA, these new sodas were expected to be in national distribution by early 1987.

•Desserts—including chocolates. High-priced chocolates—especially truffles—are becoming commonplace. Godiva Chocolatier announced a new line last year: Barringer's American Chocolate. Suggested retail price of the line is $14.00 a pound. The Godiva line retails for approximately $21.00 per pound. Earlier in the year Godiva introduced the Ivory Collection—an assortment of white-coated candies.

Chocolate is also finding its way into other new gourmet desserts. Pepperidge Farms, Norwalk, CT, introduced Distinctive Chocolatier Cookies in three varieties last year. The 4 1/2- to 6-ounce packages, which retail for $1.99, have "please keep cool" printed on the side. And Godiva introduced a line of dessert sauces last year, most of them containing chocolate.

One of the most successful gourmet categories is that of super premium ice creams, with a number of companies battling for a piece of the action. Sales for 1986 were greater than $2 billion, or approximately 16 percent above 1985 sales. This is while sales of traditional ice cream are growing at less than five percent a year.

DoveBar International, Chipwich Inc., and Pillsbury's Häagen-Dazs were among the companies introducing new products in this category last year. Love Bites are new chocolate-covered ice cream treats from Chipwich. Häagen-Dazs expanded its sorbet-and-cream line by adding new flavors. And DoveBar added a Delight Sundae to its offerings.

Another gourmet ice cream product is Viennetta Ice Cream Dessert From Good Humor, Fairfield, NJ. Viennetta was originally introduced in 1985 with expanded distribution taking place in 1986. It is now available in 40 to 45 percent of the country. New varieties were also added. Originally offered in chocolate or vanilla 20-ounce sizes, a 10-ounce package with two single-serve pieces are offered. The new size comes in vanilla or chocolate mint varieties.

Mousse du Jour was also introduced last year. Produced by Glacial Confections, Inc., Westport, CT, it is described as combining French mousse with American super-premium ice cream.

•Condiments. New products to this category include vinegars, sauces, and specialty olive oils. Secaucus, NJ-based Bertolli USA, Inc., for example, launched a new line of imported premium food products which includes Bakdia al Monte Extra Virgin Olive Oil and "Chianti Aretino" wine vinegar.

Other gourmet food categories include specialty cheeses, caviar, seasonings, and jams and jellies. A new specialty cheese line made from goat's milk was announced last year. Hailing from The Kendall Cheese Co., Atascadero, CA, the line includes: Chevrefeuille, a soft-ripening pure goat milk cheese; Petit-Chevre, drier and more pungent than Chevrefeuille; Chevre Blue, made from a blend of 75 percent goat milk and 25 percent cow milk; Chevre Frais; and Creme Fraiche.

Campbell Soup Company's Fresh Chef line was developed in response to consumer research indicating a need for fresh, refrigerated salads. The line has expanded to include soups and sauces.

Fresh

The word "fresh" has come to signify high quality and health to many of today's consumers. And numerous food processors jumped on the "fresh" bandwagon with the products they introduced in 1986. In some cases, this has been done to combat the loss of prepared food sales to foods prepared on-site in supermarkets' own delis and bakeries.

Campbell Soup Co. expanded its Fresh Chef line in 1986. The Fresh Chef line now, however, includes six soups, nine salads, and six sauces—all refrigerated. This line was developed in an effort to match restaurant quality. Currently, it is in 83 percent of the country by population. The heaviest penetration is in metropolitan areas since the product is geared more toward urban

(Continued on page 76)

Refrigerated Main Meals Introduced in 1986

Product Name	Manufacturer
Japanese Style Fresh Noodles	Azumaya
DeWitt's Table Ready Meat	Bil-Mar Foods
Campbell Express Line	Campbell Soup
Heat 'N Eat Country Egg 'N Muffin	Country Smoked Meats
Canadian Bacon Egg and Muffin	Country Smoked Meats
Frieda of California Table de France Crepes	Frieda of California
Kretschmar Entrees	Gainers
Culinova Refrigerated Dinner Line	General Foods
Gilardi's Crispy Micro-Wave Pizza	Gilardi's Pizza
Lambert's Fresh Pizza	Lambert's Pasta and Cheese
Salernos Rolls	Long Island Specialty Food Distributors
Salernos Crunchy Pups	Long Island Specialty Food Distributors
Marielle Quiche	Marielle Foods
Nasoya Foods Oriental Cuisine Fresh Noodles	Nasoya Foods
Natural Prepared Entrees	Natural
Azteca Mexican Food Line	Pillsbury
Azteca Taco Shells	Pillsbury
Azteca Tortillas	Pillsbury
Meats-To-Go	R.B. Rice
Tolona Pizza	Tolona Pizza

Source: Marketing Intelligence Services

markets. The only states where Fresh Chef is not available are: North and South Dakota, Louisiana, Arkansas, Mississippi, Montana, Idaho, and New Mexico.

Consumer research showed Campbell that consumers wanted fresh, refrigerated salads to eat either as side dishes with their meals or as healthful snacks or lunches. And so Campbell first introduced salads, with a shelf life of 23 to 28 days from the date of manufacturer.

Refrigerated salad dressings is another area to benefit from Americans' insistence on fresh. Annual growth of nine percent is predicted for refrigerated salad dressings by Packaged Facts, Inc., a New York City research company. Although, annual growth for other salad dressings – pourable, spoonable, and dry – is only predicted at under four percent.

"It's an ironic situation that in an era when Americans are eating more salad than ever before, either at home or outside, they are – with the exception of refrigerated dressing – not buying more packaged salad dressings," commented David A. Weiss, Packaged Facts president. A Packaged Facts study notes that because refrigerated salad dressings are so closely identified with the "quality trend," their immediate future is assured.

One of the refrigerated salad dressings introduced last came from Dania, FL-based Captain Rick's. A regional product, Captain Rick's Gourmet Ceasar Salad Dressing is available in Miami.

A number of refrigerated entree and main meal items were also introduced last year (see accompanying chart).

Fresh, prepared chicken items was another hot category in 1986. Showell Farms, Showell, MD, for example, added Chicken Nuggets, Aloha Strips, and Cutlets Roma to its line of Cookin' Good chicken products. These fully-cooked, breaded, boneless chicken items are sold in the fresh poultry section of supermarkets.

At the National Food Processors Association's annual conventional earlier this year, Martin B. Buchalski of Campbell Soup gave recommendations for processors interested in introducing refrigerated products. The first one was that "the product quality should be equal to or better than restaurant take-out." He also cautioned that product safety is of paramount importance.

Ethnic

The quest for more exciting meals is driving consumers to ethnic foods more and more – and not just Mexican, Italian, and Oriental but also Cajun, Indian, and others. And this is responsible for ethnic foods' contribution to major growth patterns in retail food sales.

If one particular ethnic food played a dominant role in 1986, it would be Cajun. 1986 was the first year that a major processor marketed a line of frozen Cajun entrees. Pet Incorporated, an IC company, announced the purchase of Louisiana Seafood Packers, Inc., manufacturers of Cajun Cookin', in April of 1986.

Cajuns, centered in southern Louisiana and southeastern Texas, are descendants of French-Canadian (Acadian) colonists. After being persecuted and expelled from Nova

(Continued on page 78)

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Cajun foods played an active role in new product introduction last year. The purchase of Louisiana Seafood Packers, Inc.—manufacturers of Cajun Cookin'—by Pet Inc. brought a major manufacturer into this arena.

Scotia, the Cajuns settled in the Louisiana bayous in the late 1700s. Unable to find many "European-style" ingredients, Cajuns used what was available—foul, game, shellfish, pork, peppers, and rice. (Creole cooking is a "city-style" similar to Cajun, but more refined in appearance and less spicy).

The Cajun Cookin' line currently includes: crawfish bisque, seafood gumbo, crawfish etouffee, shrimp etouffee, stuffed crabs, shrimp jambalaya, and shrimp creole. Additional items are being planned.

Other Cajun foods introduced last year by major processors included: S&W Cajun Style Stewed Tomatoes from S&W Fine Foods, San Mateo, CA; and a line of three cooking sauces from Kraft. Kraft's Makin' Cajun line consists of Creole, Spiced Brown, and Spiced Fruit.

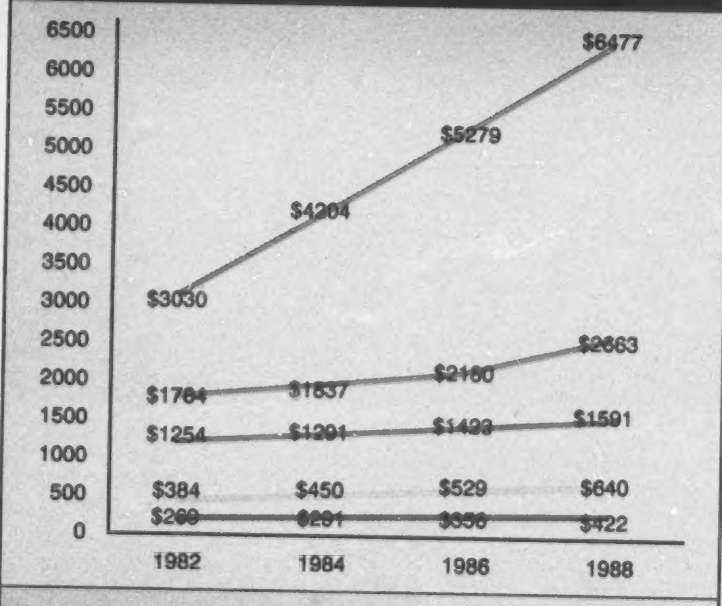
While Cajun foods made a big splash last year, they certainly were not the only ethnic foods introduced. Mexican foods continue to remain popular among U.S. consumers. And Foodways National capitalized on this trend by offering a line of Mexican low-calorie frozen entrees. Marketed under the Weight Watchers brand, Foodways National's new line offers five varieties: Beef enchiladas ranchero, chicken enchiladas suiza, cheese enchiladas ranchero, beefsteak burritos, and chicken burritos. Each entree comes in two single-serve portions in a single tray. Foodways reports exceptional success with this line.

La Preferida Inc, Bronx, NY, introduced a ready-to-eat burrito filling in a 15 ounce can—enough for six to eight burritos. Suggested retail price for the can is $1.25.

Another prepared, frozen ethnic food to hit retail shelves in 1986 was Curry Creations—a line of frozen Indian microwaveable dinners. Manufactured by Indica Foods Corporation, Chappaqua, NY, the line is available in New York, New Jersey, Connecticut, Washington, Virginia/D.C., and Philadelphia.

Curry Creations contain boil-in-bag pouches of chicken, shrimp, or vegetarian tofu curry paired with pouches of rice pilaf. The rice pilaf is also offered separately.

Selected "Foreign-Style" Food Sales (millions of dollars)



Source: Frost & Sullivan estimates

A major food processor to capitalize on Americans' interest in Oriental foods was General Mills with the introduction of Oriental Classic. These packaged dinner mixes are prepared by adding beef, poultry, tofu, or seafood, and offer sweet & sour, stir fry rice, chow mein, and teriyaki varieties.

Oriental Classics consists of a plastic mesh pouch containing rice and some vegetables; a foil pouch with vegetables in a sauce; and a seasoning or topping pouch. They retail for approximately $2.49 a package. The decision to introduce this line was based on the growing popularity of Oriental food; the health appeal of Oriental food; and the fact that many consumers don't know how to prepare Oriental foods.

One ethnic food category which has become so popular in America that we often don't think of it as ethnic is Italian. And an especially popular subcategory of Italian food is pasta—so much so that a blizzard of Americanized pasta dishes are available. FIND/SVP, a New York-based market research firm, predicts a 12 percent increase in retail sales of pasta by 1990.

In July of 1986, Campbell Soup Company announced the national introduction of Prego al Fresco spaghetti sauce—an expansion of its successful Prego Spaghetti Sauce line. The Prego al Fresco sauce was developed in response to consumer demand for a light-textured, fresher-tasting sauce.

Shortly after that, a new Italian pasta sauce dry mix blend hailed from McCormick last year—Pasta Prima. The line contains five items: herb & garlic, Alfredo, marinara, pesto, potato salad vinigarette, and herbs & seasonings. Aimed at consumers who want a more upscale product, these sauce blends were developed to duplicate restaurant quality at home.

Pasta Prima was rolled out directly into national distribution last September after consumer testing showed an 80 percent interest in the concept. Sixty percent of the consumers tested said that they would definitely buy the product. And 80 percent thought Pasta Prima was easy to prepare and had a fresh taste once prepared.

Convenience Foods

The increasing number of women entering the workforce is a major driving force behind consumers' need for foods that can be prepared quickly.

A number of the new foods introduced last year were developed to hasten preparation time in the home. One of these—Suddenly Salad from General Mills—provides a dry mix of potato or pasta and dehydrated vegetables in a flow-through pouch. The salad is prepared by placing the flow-through pouch in boiling water. Once the contents are cooked, the pouch is drained and mayonnaise or salad dressing is added. A seasoning packet, which is included with the salad mix, is then blended in.

Introduced into test market last spring, Suddenly Salad is now available nationally. Potato salad, Italian pasta, classic pasta, and creamy macaroni varieties are available. (Hard boiled eggs also need to be added to the potato salad.)

Fantastic Foods, Novato, CA, also introduced Pasta Salad Mixes last year. They combine rotoni pasta with either Italian Herb or Spicey Oriental seasoning blend.

On the sweet side, Hauser Chocolatier, Inc., Bethel, CT, introduced a Gingerbread House Kit which requires no baking to

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Suddenly Salad from General Mills offers consumers a new food with reduced preparation time.

make. The house is made from honey-dough gingerbread in "pre-fab" pieces. The kit is completed with supplied candies, cinnamon sticks, royal icing mix, disposable pastry bag and instructions.

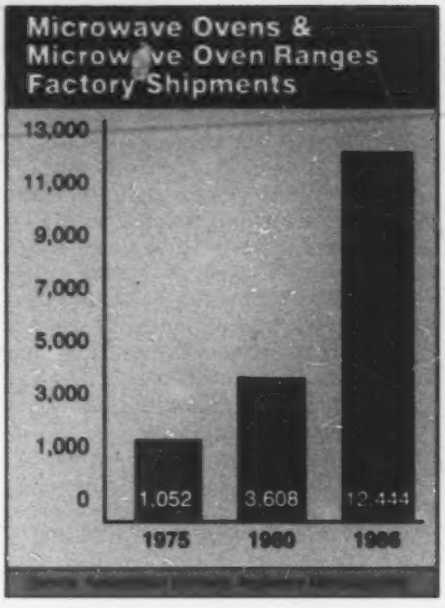
While a number of items introduced last year allow consumers to prepare "home-made-style" foods with reduced preparation time, the real action in the convenience category was in microwaveable products. 1986 was the year when microwave penetration in homes passed the 50 percent mark. The 12.4 million ovens shipped in 1986 accounted for over one-fourth of all 1986 appliance shipments and the largest annual shipment in history of any major appliance product, reports the Association of Home Appliance Manufacturers.

While microwaveable packaging is having an increasing effect of consumers' decisions of what foods to buy, this is by no means a mature market. Some indication of how consumers most often still use their microwaves, is the fact that microwave popcorn remains the top-selling product in the microwaveable category. But consumers will become more serious microwave cooks, and improved quality will be a major selling point of many new microwaveable foods. For example, Gorton's new Microwave Crunchy Fish Sticks and Fillets come with a package designed to be placed directly in a microwave oven. The package was also designed to insure a crunchy coating on the outside of the fish while the inside remains moist and tender. Patterson Frozen Foods, Patterson, CA, also introduced a product which cooks right in the box—Microfresh Vegetables.

Pillsbury was among the first to offer products specially designed for use in microwave ovens with the 1978 introduction of frozen microwave popcorn. Not a company to rest on its laurels, Pillsbury continues to introduce a host of microwaveable products. Pillsbury products introduced last year developed for specifically for microwave preparation are: Microwave Cake Mixes, Microwave French Bread Pizza, Microwave Pancakes, and Classic Microwave Casseroles.

In an effort to compete with Pillsbury for a piece of the $459 million microwave foods market, Quaker introduced Golden Grain Microwave Rice-A-Roni. It is available in selected western markets.

Last year also saw the introduction of Johnson's Hot Scoop—a microwaveable ice cream sundae—and Seneca Baked Apples—developed by Marion, NY-based Seneca Foods Corp. to be prepared in a microwave oven.



In accepting the challenge to help microwave ovens serve consumers better, Hormel developed its *New Traditions* line. The first products in this line—pre-broiled and browned breakfast meats—appeared on the market in early 1986. In the past, cooking meats has not been one of the more common uses of microwave ovens due the unsatisfactory results.

Too many new products?

Many of 1987's new food products will follow already established trends. But will the number of new foods continue to increase? Introductions so far this year indicate they will, although some skepticism has been expressed. At an American Marketing Association new-products conference held a few months ago in New York City, Herb Baum, Campbell USA President, said that while new products "are the lifeblood of consumer package goods, we all introduce too many."

"The obsession with new products in many companies diverts attention and funds from existing products—the ones that generate the revenue to pay the bills," he continued.

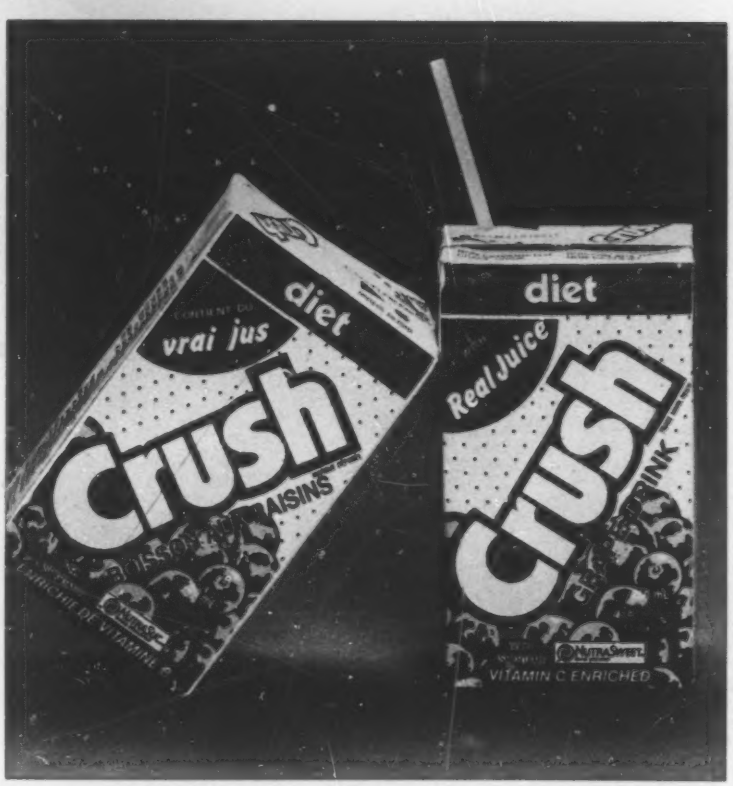
Another caution to food manufacturers from Baum was that grocery retailers have become more effective and innovative in following consumers trends than food manufacturers.

The most important point, though, is that food manufacturers must—no matter how many new product they introduce—stay tuned to consumers needs and desires when developing products.

Insert 49 or see FEM, p. 176→

SUGAR UNDER FIRE

Corn sweeteners surpass sucrose as the nation's top sweetener. HFCS volume levels off but crystalline fructose, dry HFCS and new aspartame approvals will further cut sucrose use. Waiting in the wings: A host of new sweeteners.



Aspartame can be used in aseptic fruit drinks, where pH is ideal, if exposure time to high temperature is minimized and followed by rapid cooling. Application shown here is from Canada, a petition is pending in U.S. (Photo: NutraSweet)

Sugar (read "sucrose") is under increasingly heavy fire on two fronts: Cost and diet. New developments in corn sweeteners and aspartame are leading the attack, and a host of new sweeteners are mustering behind the lines to charge if and when they gain regulatory approval.

Corn sweeteners, less costly than sucrose, now account for more than half the caloric sweetener use in the U.S.—52 percent in 1986. According to USDA, refined sugar use in the U.S. fell steadily from 9.52 million short tons (dry basis) in 1980 to 7.32 MST in 1986 and will slide further to 7.2 MST this year. Corn sweetener use, meanwhile, soared from 4.58 MST in 1980 to 8.12 MST last year and will reach 8.26 MST in 1987. Major contributor: High-fructose corn syrup, which more than doubled from 2.18 MST in 1980 to 5.53 MST last year as soft-drink bottlers shifted from sucrose and invert sugars to 100 percent HFCS to sweeten their non-diet products. USDA projects 1987 HFCS use at 5.65 MST.

Total sweeteners slip

Overall U.S. sweetener consumption grew from 133.3 million metric tons in 1981 to 149.2 MMT in 1985, then slid to 148 MMT last year. Per-capita consumption of caloric sweeteners jumped from 125 lbs. (dry basis) in 1980 to 131.2 lbs. in 1985, fell off to 129.5 lbs. last year and will slip to 128.5 lbs. in 1987, says USDA. Reason for the decline: Growing applications for aspartame, especially since FDA clearance for carbonated soft drinks in 1983. As shown on the adjoining table, aspartame use soared from 0.2 MMT in 1981 to 13 MMT in 1986 and will continue to climb as FDA clears the sweetener for more applications—as occurred last November (*FE* Jan., '87).

Sucrose the loser

But the decline in caloric sweeteners has all been at the expense of sucrose. Per-capita consumption of refined sugar slumped dramatically from 83.6 lbs. in 1980 to 60.8 lbs. last year and will fall to 59.1 lbs. in 1987, says USDA. Per-capita consumption of corn sweeteners, meanwhile, rocketed from 40.8 lbs. in 1980 to 67.3 lbs. in '86

(Continued on page 108)

CHARLES E. MORRIS
Midwest Editor

SWEETENERS

Aspartame can even be used in some baking applications, such as frozen fruit pies marketed by McCain Foods in Canada. Fruit fillings are sweetened with NutraSweet/sugar blends to cut calories 30 to 45 percent. (Photo: NutraSweet)

and will reach 67.9 lbs. this year. As noted above, HFCS is the major factor, with per-capita consumption rising from 19.1 to 45.8 lbs. 1980-86 and 46.4 lbs. this year.

Diet controversies

On the diet front, the 230-page Sugar Task Force report released last September by FDA once again clears sugars of all health hazards except dental caries, but it remains to be seen if it will clear away consumer misperceptions about sugar. One popular misconception: Sugar is "fattening," although like any other carbohydrate it contains only four calories per gram. Sugar plays no unique role in causing obesity, says the FDA report, boosting the Sugar Association's promotional campaign which stresses sugar as GRAS, natural, low in calories at 16 per teaspoon and – as the best-tasting sweetener – the standard against which other sweeteners are measured.

On the other hand, aspartame and saccharin offer consumers the opportunity to cut calories without sacrificing sweetness. As shown on the table, however, saccharin consumption slumped dramatically since 1985, mainly due to replacement by aspartame in diet soft drinks. Because saccharin in large doses over long periods causes cancer in laboratory rats, FDA proposed banning saccharin back in 1977 but the sweetener continues in use under repeated Congressional stays of the ban. On Feb. 19, Sen. Alfonse D'Amato (R-NY) introduced a bill to extend the ban moratorium until May 1, 1992.

The Corn Refiners Assn., meanwhile, has circulated reports of recent research which shows that artificial sweeteners have had no effect on lowering the U.S. obesity level and suggests that artificial sweeteners may actually increase appetite and thirst, causing consumers to overcompensate with other foods. NutraSweet Co. in turn is sponsoring research at Harvard Medical School to determine if substituting aspartame for sucrose can help weight loss.

U.S. sugar deliveries to industrial users, 1980, 1985 and Year-to-Date 1986

Item	Calendar year		Jan.-Sept.		Fiscal year (FY)		Percent change, FY 1985 to FY 1986
	1980	1985	1985	1986	1985	1986	
	Thousand short tons, refined*						
Bakery/cereal	1,337	1,494	1,131	1,084	1,471	1,447	-1.7
Confectionery	932	1,059	788	782	1,052	1,053	.1
Processed Foods	535	428	351	313	439	390	-11.2
Ice cream/Dairy	450	456	356	347	449	448	-.1
Other	589	441	322	318	420	437	4.0
Beverage	2,161	340	276	211	436	274	-37.2
Nonindustrial	3,353	3,123	2,282	2,250	3,124	3,091	-1.1
Total, including non-food	9,477	7,472	5,609	5,407	7,520	7,270	-3.3

*U.S. deliveries data do not include Hawaii. To convert to raw value, multiply by 1.07.
Source: Sugar Market Statistics, NASS and ERS, USDA.

Sugar: Global glut, U.S. short?

Ironically, in the topsy-turvy world of sugar economics, a global glut plus increased U.S. production may actually lead to a *shortage* of sugar in the U.S. this year.

Most producing nations subsidize production, create surpluses, then subsidize export of their surpluses, while protecting prices at home through tariffs and import quotas. The "world price" of sugar, which averaged 5.1 cents per lb. in 1986, is really a dumping price for subsidized export of surpluses and covered only about 15 percent of world sugar trade last year. USDA forecasts 1987 world production at 100.1 million metric tons, up 2 percent from last year, and consumption at 99.7 MMT, also up 2 percent. Carryover, however, will be 46.8 MMT, continuing the glut.

U.S. sugar production will be about 6.35 million short tons (3.2 beet, 3.15 cane), up 5 percent over last year but deliveries – which fell 3.4 percent last year – could fall another 2 percent this year due to inroads by alternative sweeteners and imported processed foods containing sugar, said Robert D. Barry of USDA at the agency's 1987 Outlook Conference, last December 3 in Washington.

The U.S. supports the price of sugar through loans to producers (against crop collateral, at no cost to the taxpayer) and through import quotas to prevent foreign sugar coming in at prices below loan levels. U.S. import quotas progressively dropped from 2.98 million tons in 1983 to 1.85 million tons last year. On Dec. 15, USDA again lowered the quota to slightly more than 1 million tons, provoking complaints from refiners. According to I.H. Kempner III, chairman of Imperial Sugar Co. and also chairman of the U.S. Cane Sugar Refiners Assn., reduced imports will likely cause regional shortages and higher prices this year in spite of higher U.S. production.

CF: New growth category

Corn-sweetener deliveries surpassed sugar for the first time in 1985, said Barry, but HFCS displacement of sugar is leveling off and "is almost complete." HFCS 55 (55 percent fructose), used in beverages, may grow no more than 2 percent per year, while HFCS 42 (42 percent fructose), with wider potential application, could grow 3-4 percent per year.

Crystalline fructose (which will be commercially available in June from A.E. Staley) "will grow at a faster rate" than HFCS but will take several years to reach its full potential, said E. Raymond Stanhope, vice-president of Staley Continental, at the Outlook Conference.

Unlike crystalline fructose fractionated from sucrose, Staley's *Crystar* (*FE* Sept., '86) is produced from HFCS and comes in several blends and granulations ranging from 35 to 60 cents per pound as compared to 60 to 90 cents per pound for the sucrose-derived product. Crystar is 99.5 percent (minimum) fructose, which in crystalline form is 1.6 to 1.8 times sweeter than sucrose and synergistic with other sweeteners. One unique synergistic quality of fructose: When blended with sucrose, the blend

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U.S. use of noncaloric and caloric sweeteners, 1980 to 1986

Calendar year	Saccharin	Aspartame	Total of noncaloric sweeteners*	Caloric sweeteners	Total all sweeteners
	Million metric tons, raw value				
1980	7.7	0.0	7.7	125.0	-
1981	8.0	0.2	8.2	125.1	133.3
1982	8.4	1.0	9.4	123.2	132.6
1983	9.5	3.5	13.0	124.6	137.6
1984	10.0	5.8	15.8	126.9	142.7
1985	6.0	12.0	18.0	131.2	149.2
1986	5.5	13.0	18.5	129.5	148.0

*Sugar-sweetness-equivalent. Assumes saccharin is 300 times as sweet as sugar and aspartame is 200 times as sweet.

Source: ERS, USDA statistics.

Commercial-scale pulse-combustion dryer at Purdue University is producing dry HFCS 42 for a Japanese licensee while he builds a plant. (Photo: U.S Development Corp.)

is sweeter than either fructose or sucrose alone. Crystar further offers gel properties, reduces set time with starch, lowers water activity and reduces staling in baked goods, says Staley. Typical applications: Powdered beverages, cereal coatings, puddings, gelatins, confections, frozen foods (where it preserves cellular structure) and baked goods.

World demand for corn would soar by 80 million tons if overseas markets were available to liquid corn sweeteners, said Stanhope, but protectionist policies of other nations prevent corn sweeteners from competing with sucrose.

Dry HFCS: Problem solved

Sweet-C 42, a dry 42 HFCS produced via pulse-combustion drying technology (*FE* May, '86), was unveiled February 24 by U.S. Development Corp. at the 1987 International Sweetener Colloquium held by the Sugar Users Group in Palm Springs, CA.

Developed jointly by USDC and Purdue University, pulse-combustion drying combines heat and acoustics to dry viscous products formerly difficult or impossible to dry, and does it at temperatures much cooler than conventional spray drying to reduce product degradation by heat. Early research was assisted by ADM, Amaizo, Cargill, Hubinger and Staley, all HFCS producers. USDC licenses the technology.

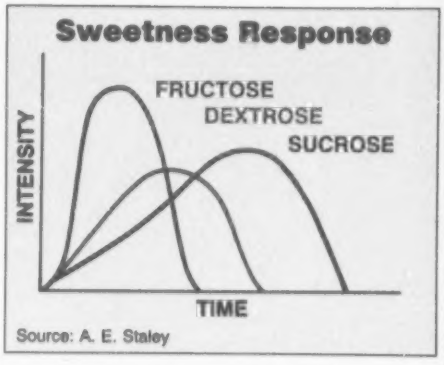
Early problems with hygroscopicity in the finished product have been solved by a proprietary encapsulation process, resulting in dry HFCS which disperses readily in cold liquids without cloud or sediment, says USDC President Hayes E. Gahagan. First target market: Powdered fruit juices, sweetened with either Sweet-C 42 alone or in blend with sucrose for synergy. Sweet-C 42 will sell at or below the price of sucrose, said Gahagan. USDC has also successfully dried and encapsulated HFCS 55, 90 and 95 – the last "close to pure fructose."

Aspartame: Heat-stable uses

Aspartame in solution can convert over time to its component amino acids, leading to loss of sweetness (but no off-taste). As with most reactions, conversion rate increases with temperature, limiting the use of aspartame in processes calling for high temperature over extended periods of time.

But aspartame can be used in many heat applications if a few simple rules are followed, said Dr. Barry E. Homler, director of applications for The NutraSweet Co., at the Sweetener Colloquium.

Stability of *NutraSweet* is affected by three interrelated factors: Time, temperature and product pH, Homler explained. As time at any given temperature increases, percentage of remaining NutraSweet decreases; as temperature increases for a given time, the amount of NutraSweet again decreases. pH will produce different effects over varying time/temperature ranges.



NutraSweet is most stable in the 2.5 to 5.5 pH range, where most foods exist, with optimum pH at 4.2.

Adverse effects of heat on NutraSweet can be minimized, said Homler, by:

- Adjusting pH closer to optimum;
- Reducing exposure time to high temperatures by adding NutraSweet during the last stages of cooking;
- Rapid cooling following cooking.

Example: For refrigerated or frozen (concentrated) fruit drinks (two of the categories cleared for NutraSweet by FDA last November), pH of 3.3 to 3.6 is near optimum for NutraSweet. HTST processing conditions for refrigerated products is 185-210°F for 15 to 30 seconds with rapid cooling. NutraSweet loss in processing is only 2-3 percent. Use levels will depend on sweetness profile desired but are probably in the 350-450 ppm range. Shelf life for refrigerated drinks is 6 to 8 weeks, for frozen concentrates more than a year.

By following the rules listed above, NutraSweet can even be used in UHT-processed aseptic products, especially fruit drinks where pH is near optimum for NutraSweet. Example: Diet Crush aseptic fruit drinks, sweetened with NutraSweet and marketed in Canada. (Squirt has petitioned FDA to clear NutraSweet for aseptic fruit drinks here.)

NutraSweet can even be made heat-stable for certain baking applications. Example: *Lite Delite* frozen fruit pies marketed in Canada by McCain Foods. According to the label, fruit fillings are sweetened with a synergistic blend of NutraSweet and fructose-glucose and/or invert sugar and

(Continued on page 114)

SWEETENERS

Breath mints were one of four new food categories cleared for aspartame by FDA in Nov., 1986. Nabisco Breath Savers are marketed in Canada, similar products will soon be seen here. (Photo: NutraSweet)

dextrose to reduce calories by 30 to 45 percent, depending on pie variety. Again, pH of the fruit fillings is ideal for NutraSweet at about 3.5. In processing the fillings, NutraSweet is added after heating. The consumer bakes the pie at time and temperature sufficient to brown the crust and warm the filling without degrading the sweetness of NutraSweet.

NutraSweet is only a sweetener and flavor enhancer, Homler points out, so in some applications it must be used with a bulking agent such as maltodextrin, polydextrose or sorbitol (or sugars, as in the fruit pies) to replace the functionalities of sugar.

Another aseptic application for NutraSweet in Canada: Reduced-calorie fruits for yogurt, aseptically processed and packaged bag-in-box by Flavor Shades Co., a unit of Shade Foods. Lucerne Milk Co., a division of Safeway Stores, introduced reduced-calorie yogurt in May, 1986, and there are now four brands on the Canadian market – three with fruits sweetened by NutraSweet alone (with bulking agents), one with fruits containing a NutraSweet/sugar blend. Calories are reduced by 50 percent as compared to conventional yogurt. Reduced-calorie yogurt is a "rousing success" in Canada, where it has expanded the total yogurt market "with little cannibalization of regular yogurt," reports Timothy J. Coughlin, national accounts manager for NutraSweet in Canada.

Flavor enhancers & potentiators

Glycyrrhizin, a non-caloric extract of the licorice root 100 times sweeter than sucrose, is marketed in several blends as a flavor enhancer and potentiator by MacAndrews & Forbes under the brand name *Magnasweets*, which are boosting flavor and cutting flavor costs in a growing range of foods. "Just a few parts-per-million is usually all that's needed," says the supplier.

Thaumatin, a mixture of sweet-tasting proteins derived from a West African fruit, 2,500 times sweeter than sucrose and synergistic with other sweeteners, is marketed by Tate & Lyle under the *Thalin* brand. Because of its intense sweetness and linger-

(Continued on page 116)

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SWEETENERS

ing, licorice-like aftertaste, Thalin is positioned as a flavor enhancer and modifier rather than as a sweetener, says Roger Huss, new products manager at Tate & Lyle. Non-cariogenic, Thalin is GRAS in chewing gum and the supplier is seeking GRAS extension for other food and feed applications.

Sweeter future?

A lengthening roster of non-caloric sweeteners is waiting in the wings for further R&D or regulatory clearance to compete with caloric sweeteners and aspartame. If and when they become available, of course, is anybody's guess. Here's a rundown on the most significant:

• Cyclamate, 30 times sweeter than sucrose, was banned after several years of use in 1970 by FDA for suspected carcinogenicity but has been cleared of that charge (*FE* Aug., '84, Nov., '85). Manufacturer Abbott Laboratories and the Calorie Control Council (CCC) have jointly petitioned for reapproval.

• Acesulfame K, a non-metabolizable organic salt 200 times sweeter than sucrose, was discovered in Germany and developed here by American Hoescht Co. Approved in many countries, "it has potential for use in all areas where sweeteners are now used," says the CCC. A petition is pending here.

• Sucralose, a sucrose chloroderivative reportedly 600 times sweeter than sucrose, is made by altering the sucrose molecule.

Johnson & Johnson Co. petitioned FDA for clearance on Feb. 12 of this year. According to the CCC, several other chloro-sucrose derivatives ranging from 5 to 2,000 times sweeter than sugar have been developed but await long-term toxicity tests.

• Alitame, a low-calorie dipeptide of the amino acids L-aspartic and D-alanine, reportedly has a taste similar to sucrose but is 2,000 times sweeter. A petition is pending at FDA, but Alitame is not cleared anywhere.

• L-sugars, the so-called "left-handed sugars" with molecular structures the reverse or "mirror image" of common sugars, are non-metabolizable and have no aftertaste.

Lev-O-Cal Co., formed by Biospherics Inc. (Rockville, MD) and two Italian partners (Montedison and Ferruzzi Group, the latter accounting for 15 percent of EC sugar production), has developed L-glucose and L-fructose and hopes to gain regulatory approval by the early 1990s. Manufacturing cost for L-glucose is now under $1.00 per lb. but is not yet economical for L-fructose, says Lev-O-Cal.

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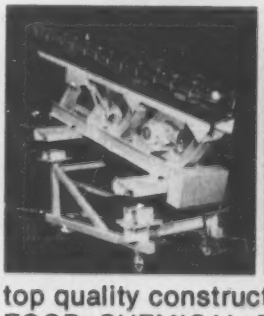

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